P R O C E E D I N G S

MR. GRAY: Good afternoon. My name is Gary Gray, and I am the Executive Secretary of this panel, the Panel to Review the V-22 Program.

On December 15, 2000, then-Secretary of Defense Bill Cohen determined that the accident history of V-22 aircraft and other testing issues required an independent, high-level review of the program. He established this Panel, appointed these four distinguished gentlemen seated at the table, to conduct this review. It should include safety of the aircraft and to recommend any proposed corrective actions. He asked that the review be completed and a report submitted to him as soon as possible.

The Chairman of this Panel is retired Marine Corps General John R. Dailey. His 36-year career in the Marine Corps included extensive command and staff experience. He has flown over 6,000 hours in a wide variety of airplanes and helicopters. He has served at NASA as the Associate Deputy Administrator. General Dailey is currently serving as the Director of the National Air and Space Museum.

General Dailey.

CHAIRMAN DAILEY: Thank you, Gary.

I would like to introduce the members of the Panel.

To my left: Mr. Norman Augustine, who has served as the Undersecretary of the Army; Chairman and CEO of Martin Marietta Corporation; Chairman and Chief Executive Officer of Lockheed Martin Corporation; lecturer with rank, a professor, Princeton University Department of Mechanical and Aerospace Engineering; and Chairman of the National Academy of Engineering, and President of the American Institute of Aeronautics and Astronautics.

To my right: General J. B. Davis, retired from the United States Air Force after a 35-year career of service. During those years, he accumulated extensive operational experience. After retirement, he has stayed engaged in the aircraft world, to include commercial aviation.

To my far left: Dr. Eugene Covert currently serves as the Director of the MIT Center for Aerodynamic Studies and the Wright Brothers Facility. He is the T. Wilson Professor Emeritus in the Department of Aeronautics and Astronautics at MIT. He's had a long and

distinguished career at MIT.

In addition to being the Chief Scientist of Training, U.S. Air Force, Dr. Covert has also served as Chairman of the Air Force Scientific Advisory Board; as a member of the NASA Aeronautics Advisory Committee; and as Chairman of the A-Guard Power and Energetics Panel. He is the Honorary Fellow of the AI-AA, a Fellow of the Royal Aeronautical Society and the AAAS, and is a member of the National Academy of Engineering.

At this point, I'll turn the meeting over to Mr. Gray.

MR. GRAY: Allow me to introduce the Panel Staff.

Colonel Rick Schwartz is the Marine Corps Representative.

Colonel Andy Steel is the Air Force Representative.

And Mr. Bryan O'Connor is our Technical Representative.

The notice of today's meeting was posted in the Federal Register on February 15th. The purpose of this session is to gather information on the V-22 Program from the interested public. Only those individuals who

requested to present oral comments will be allowed to speak, as reflected in this meeting's agenda.

The Panel will not provide copies of the handouts and materials presented; however, should you wish to review the materials, they will be available for review at the Panel's office located at 1235 Jefferson Davis Highway, Suite 940, Arlington, Virginia. Please call Carolyn Duke or Doug Pang on 703/602-1515, to make an appointment.

For those of you who are scheduled to speak, we ask that you please keep your remarks to your allotted time so that all have the opportunity to address the Panel. I will signal each of you when we have one minute left so that you can wrap up your comments.

For members of the media and the audience in attendance, please be reminded that the purpose here is fact-finding in nature. This is not a press conference and Panel members will not entertain questions, nor provide a statement.

Our first presenter is Congressman Bob Filner.

Congressman Filner.

(No response.)

MR. GRAY: Okay. Our next presenter is Mr. John Douglass.

MR. DOUGLASS: Good afternoon, ladies and gentlemen. I want to begin my brief remarks by saying "thank you" to the Panel. I've been involved in panels of this type in the past and what you are doing here is not easy. We all know that this program has been involved in some tragic incidents and the emotions around those incidents are real; the pain of the families is real; and those of us who have served in the military know there is nothing that grips at our heart strings more than the loss of shipmates and those that served with us. So that part of what you're doing today is going to take a lot of sensitivity and a lot of courage to get through it, and God bless all concerned with that.

Balance in judgment is going to be needed as this Panel does its work because these are tough times. I've been in this business about 40 years. I'm an engineer. I'm a military officer. I've been a user of this kind of technology. I've been a tester. I've seen this from the viewpoint of Congress. I've been on the National Security Council staff, and I was the Navy's acquisition official for three years during part of this

program's history.

I'm not here today, though, to talk about the program. I'm here today to talk about the technology and where it fits into America's industrial base. So with your permission, I'd like to submit my written statement for the record and I'll just make a few points, and then we'll hopefully get on with the congressman and the other people's comments.

The first point that I think it's important for the Panel and for those gathered here today to understand is that America's aerospace industry today is somewhat between the proverbial rock and a hard point. We're going through a period of adjustment that a lot of people call the "Post-Cold War Period."

During this period, the traditional sources of revenue for the industry's research-and-development have changed dramatically. The Department of Defense, and all of its services, has drawn down dramatically on the kind of research that it does, to the point where today we are at the lowest investment levels that we've been at for well over 50 years in terms of our gross national product -- percentage of our gross national product.

During this period of adjustment, the industry has sustained itself, largely through sales to the global economy. As a matter of fact, if you were to go back to the middle of the Cold War, about -- somewhere at 60 to 70 percent of our sales were to the military. Today, that level is below 30 percent, and over half of what we produce in the country in many parts of the industry are exported outside the United States.

Now, while this has been going on -- this transition has been going on, we've seen both here and in Europe, which is our major trading partner, our air traffic control systems are approaching gridlock. Anybody who's traveled on a stormy spring day or a summer day where there are lots of thunderstorms know that, with just a marginal intrusion into the system, the whole system can grow into gridlock.

At the same time, what we've seen is that our former allies have some major disputes with us on trade and on things like aircraft noise and subsidies, and this is taking place against a background in which there is a very small difference, if any at all, between the kind of commercial aviation technology which exists in Europe and the kind of commercial aviation technology

which exists in the United States, with a few exceptions. One of those exceptions is tiltrotor technology.

Now, there are many people in this country who look at the air traffic control system we face today. They look at the ecological barriers to building new airports; and as I'm sure the Panel knows, there's only one new airport being built in the United States today and it is under a halt right now for ecological reasons.

If you can't build new runways, about the only way you're going to be able to get people out to those hubs is some form of tiltrotor technology, and the tiltrotor technology has the unique attributes of speed, ability to land in a small area -- which means you don't need new runways -- and a very low noise profile.

And for those of you that aren't familiar with the noise problem, you should be aware that we have a dispute now in the International Civil Aviation Organization with our allies because American airplanes that fully meet IKO standards are now banned from the skies of Europe because of noise.

So noise is a very real issue for our industry, and one of the advantages of tiltrotor technology is that you can come in over the airport and

you have a very low noise profile in the area around the airport. So this is a time of change, and it's a time when there is a very difficult time for our industry.

Now, the second point is that we've spent about 45 years working on this technology -- this isn't something that has just sprung up overnight -- and we've spent tens of billions of dollars on it, and during this same time that we've done this, as I said before, our allies have reached parity with us in most other areas. So my second point is essentially that I think it would be a huge mistake for us to abandon this technology and the benefits that it will bring to us in our commercial sector just when we're on the verge of reaping those benefits.

I think there is a -- somewhat of an analogy between this program and the Concord program in the sense that the technology that went into supersonic transports was developed largely based on American investments and our European allies were the only ones who turned it into a product.

There is one final point and I'll turn the podium over to others. The development of aviation and aerospace products is not -- cannot be done without risk.

Those of us that been involved in it over the years know that we do everything humanly possible to mitigate the risk, but the risk is always there. It always has been there.

Those of us who know about the history of the industry remember the problems we had transitioning from propeller airplanes to jet airplanes in the 1950s, when pilots were used to rapid throttle response to props and had a terrible time adjusting to the later response of turbines.

We all have heard the stories of the lives that were lost as aviators learned to fly across the Atlantic. We remember the development of airmail and night flying in the '20s and '30s, as aviation was pioneered in this country. Most of us, in one way or another, were actually witnesses to the terrible Challenger disaster and many of us remember the Apollo incident.

All of these things are terrible things that have been a part of the development of an industry in our military and in our commercial sector that's vital to the American economy, vital to America's security, and those of that have been intimately involved in this

know that over the years we have tried to the best of our ability as a nation to test our products to their limit before we introduced them to the public or before we introduced them to our armed services in general. Indeed, the level of testing -- we call it in the military "Operational Test and Evaluation" -- has increased rapidly during the time of this technology's development.

I think there is a dilemma here between how much testing you do and how much testing you don't do. This is probably one of the central dilemmas of the Panel. I would just conclude my remarks by saying that I think the technology is needed. It's needed for air traffic control relief. I think it has value to our military.

And God bless you all for doing what you're doing. This is a tough task and my heart goes with you. Thank you.

MR. GRAY: Thank you, Mr. Douglass.

Congressman Filner has arrived.

Congressman Filner.

CONGRESSMAN FILNER: Thank you.

Good afternoon. And I want to thank the

members of the Panel for giving many of us the opportunity to express the concerns we have about the V-22 Osprey.

I don't have to tell the Panel that today we ask our Marines to be engaged in an increasing number of operations and areas all over the world. We ask that they project force into hostile territories, to protect people they never have met, in lands they've never seen. We ask that they do this while being compensated minimally, using aging equipment, any day of the week, any time of the year, with barely the slightest expressed gratitude on the part of those who demand this of our military forces. And our Marines, like all members of the U.S. Armed Forces, do this without question or complaint, placing themselves in harm's way bravely and honorably.

Unfortunately, I cannot speak with the same confidence about the V-22 that I do of the U.S. Marines. You all know the history. On December 11th, 2000, MV-22 Osprey crashed near Jacksonville, North Carolina, killing all four Marines on board; the fourth crash since 1991, and its third lethal accident. As I understand, 23 people were killed last year because of

accidents by the V-22.

I have a simple question: If this is the vehicle that is expected to carry our Marines safely and make defending America more effective, why is the program so full of Marine and civilian deaths, not to mention the nonlethal crashes, the engine fires, the driveshaft failures, hydraulic leaks, and the occasions when the pieces of the rotor just flew off?

The April 8th, 2000, crash was blamed on an environmental condition known as "power settling," or "vortex ring state." While this is attributed to pilot error -- specifically, descending at or in excess of the recommended flight envelope -- eight months later, Lieutenant Colonel Keith Sweeney and co-pilot Major Michael Murphy crashed in an Osprey. Here, the pilot error case is much more difficult to make.

These were two of the most experienced Marine Corps pilots permitted to fly the craft and they had a total of 280 and 309 flight hours, respectively, in the MV-22. Lieutenant Colonel Sweeney had over 4,000 total hours between the MV-22 and CH-46, while Major Murphy had almost 3,000 hours total flight time. If the most experienced officers are unable to control the V-22,

who exactly should we turn to to do this?

Another problem and devastating to the Osprey Program is the ongoing investigation by the Department of Defense Inspector General into allegations that mechanics have explicitly been directed to falsify maintenance records and safety evaluations of the V-22 Program.

Now, I don't want to get into the intricacies of the flight mechanics of the Osprey or the command decisions of the program, but this, coupled with the horrible loss of Marine and civilian lives, makes the whole program highly suspect.

Now, I represent San Diego, California, and I'm here today because one of the bases being eyed to house the V-22 is the Marine Corps Air Station at Miramar. It is the only major, heavily populated metropolitan area likely to be exposed to the large daily volume of Osprey overflights.

Now, I have a map -- Have you gotten my presentation?

Is Colonel Buckles here?

Can you make sure the Panel members get this?

I have a map of the flight paths that the helicopters will fly at Miramar, and I will tell you virtually half of San Diego County is under the flight paths. Ospreys would fly over communities in San Diego like Mira Mesa, Sorrento Valley, La Jolla, and the highly congested Interstate 5 and 15 freeways. Think of the devastating impact another Osprey crash would have at the height of a rush hour; in the middle of a business park or an elementary school in a quiet neighborhood.

My concern is for my community, and San Diego should not be asked to tolerate a military program that compromises the safety of those who live under its shadow, especially if there is a strong possibility of that shadow crashing down on them or dropping its parts from a thousand feet overhead.

We are not talking any longer about problems of mechanics, technology, or pilot error. Those are all real problems, of course. But this craft will not be deployed, if it is at Miramar, in a desert or an open testing ground. The V-22 is going to end up in the middle of a lively, active city. America's finest city, as we like to call it. I am not willing to risk the lives of the people I represent on a program that has a

questionable safety record to begin with.

The neighborhoods I represent in San Diego feel that it would not be prudent for us to rush to judgment on further development of the Osprey. I would hope that we see at least a one-year suspension to thoroughly examine the program. That would give us time to analyze the problems evident with the technology, the training, the command, and then base our decisions on the full information that such an evaluation would bring.

I ask again, in the name of the folks I represent in San Diego: Go slow; make sure we're safe; don't subject us to a possible crash and its devastating consequences. I thank the Panel.

MR. GRAY: Thank you, Congressman Filner.

Our next speaker is Mr. Frank Gaffney.

MR. GAFFNEY: Mr. Chairman and members of the Panel, thank you very much for allowing me to contribute to your deliberations today.

I approach this, as some of you know, from the perspective of -- not a technologist, by any means -- someone who has had the opportunity to serve on Capitol Hill, in the Defense Department, and most recently as an active participant in the national security debate. I

have been interested in this program from its inception, however, and particularly from the time when then-Secretary of Defense Cheney first decided to terminate it.

My expertise is policy, as I say, rather than technology. From a layman's point of view, for what it's worth, on the technology side, it certainly seems to me that given the maturity of this program, what is yet to be done to validate it as a technology is certainly less than a great many other technical challenges this country has risen to and prevailed over in the past.

It's not to say that every aspect of this program is perfect at this point or that there can't be technical improvements made. You understand, I think probably better than anybody, that that is true, but it is usually true of a developmental program, and certainly a developmental aircraft.

It seems to me we probably have forgotten in some instances how difficult some of the previous feats we've risen to have been. We've forgotten what the costs, both in lives and in national treasure, have been. And, yet, I think where we have seen a national imperative to prevail, we have done so as a nation time

and time again.

And my principal argument to you today for a recommendation to continue to finish the development of this aircraft and to put it into production is based really on those previous experiences with the national imperatives, and the national imperatives in this case, it seems to me, fall into two categories.

One is the one that's most obvious, and that is, the military's requirement for this aircraft; for a tiltrotor capable system. And I use the word "military" advisedly because it seems to be a virtual certitude that if the Marine Corps does in fact get the opportunity to perfect this aircraft, to bring it into service for its own purposes, that every other American military service is going to sign up, as will a great many other nations as well. That's simply because of the quality that this aircraft brings to the task of meeting a variety of very challenging, sometimes very dangerous, military requirements.

There's a lot of talk these days about the revolution in military affairs. There's a lot of talk these days as well about skipping a generation of military procurements. I suggest to you that if that

term -- "revolution in military affairs" -- means anything, it is that this kind of technology needs to be brought to bear, not condemning the Marines -- and the other services, for that matter -- for the open-ended future, to using the old generation of technologies: the helicopters, even more modern versions thereof.

As you know, this program has been subjected repeatedly to the rigors of cost and operational evaluation assessments. It has, time and time, and time again, been conclusively demonstrated that the V-22, the tiltrotor, is the way to go; most immediately for the Marines, and I think you'll see, as I say, for its application in other services' roles and missions as well.

Were we to send this program back to the drawing boards, as some have counseled, were we to cancel it outright, I am convinced that what we will do is not only set back the effort to advance our military and its performance of missions that will probably become more challenging in the decades ahead, we will wind up paying in a currency that we hold particularly dear, and that's the lives of Marines and other service personnel as well.

The second argument that I would make, that may or may not seem to be part of your mandate but I honestly don't think you can do your job unless you take it into account -- and that is, the larger national interest in the realization of the V-22 technology.

I had mentioned I was on the Senate Armed Services Committee staff, I think. I had the privilege during that time in 1981 of working on a program that some of our counterparts on the House side had decided should be terminated. It was right in the same place this program is: expensive research-and-development program, about to turn into a very expensive procurement program.

And as often happens, some experts were found to come forward and to tell the House Armed Services Committee that this program was not necessary; there are other ways to do the job; the costs could be avoided by failing to proceed with it and, instead, pursue some of the other alternatives. Even military officers gave testimony that they'd be just as happy not to fool with it.

Fortunately -- and it was a very near-run thing -- the last issue resolved in the Defense

Authorization Conference for that fiscal year wound up with the Senate prevailing and the House position being rejected, and as a result, today we have a program called the "Global Positioning Satellite System."

Now, we pursued that program because it had obvious military benefits. Those benefits are now on display every day. They have in fact powered the revolution in military affairs. But they've also done something else for the country as a whole -- something that was a gleam in the eye at the time of our debate in 1981, but that's now being the gleam in a lot of bank accounts throughout our economy -- and that's a $10-billion program -- or application of GPS program, I should say -- that has redounded to our economic and also national security benefit in innumerable ways.

I'm not going to tell you gentlemen that the V-22 is exactly the same in terms of its multiplied effects as the GPS program, but I am going to tell you that we don't know today all of the ways in which the V-22's technology will be applied to do the betterment of our country, its economy, and the way we do any number of missions today, both civil and military.

It now appears as though the choice as to

whether the American military and the nation as a whole will have the opportunity to realize the combat and economic potential of the V-22 rests largely with you to decide. It is an awesome responsibility, and I respectfully suggest that it can only be exercised properly by taking into account the considerations that I've mentioned here, considerations that transcend the narrow technical questions with which you have appropriately and of necessity been principally concerned.

If you factor into account these other considerations, I am confident you and, more to the point, the American people will agree with me that far from being unable to afford the V-22, and to purchase it in quantity, the United States simply cannot afford not to acquire the Osprey, and in so doing, to foreclose these opportunities.

I suggest to you we owe it to the men who have lost their lives tragically -- to, it appears, factors that were not attributable to the Osprey's tiltrotor design -- to ensure that they have not died in vain.

I urge you in the strongest possible terms

to recommend continued development and production of the V-22. By so doing, you will permit the sacrifice of those men to translate into an enduring legacy for both their beloved Marine Corps and the nation as a whole, which they served with distinction.

Thank you.

MR. GRAY: Thank you, Mr. Gaffney.

Our next speaker is Mr. Daniel Schrage.

MR. SCHRAGE: I am Professor Dan Schrage. I've been at Georgia Tech as a Rotorcraft Design Professor since 1984. I direct the nation's largest Rotorcraft Center of Excellence there at Georgia Technology.

But I go back about 35 years involved with vertical flight aircraft, going back to being a pilot in Vietnam, flying lots of different kinds of aircraft; being an engineer, manager, and senior executive with the Army Aviation Systems Command, in the development of all the Army helicopters, from the Apache to the Black Hawk, and to the Comanche that's in development.

And as I mentioned, for the last -- about 17 years, I've been involved with rotorcraft design. I've done accident investigations of all kinds of

accidents, and I've also been involved in helping with industry designs.

And as far as a tiltrotor aircraft, which is what we're talking about here, it's really the most logical V/STOL aircraft. I mean, if you look back at the last 30 or 40 years, you'll find out that numerous different kinds of V/STOL aircraft have been tested; and it's kind of a filtering process that the tiltrotor aircraft makes the most sense, and a lot of it has to do with the safety features incorporated in it.

I'm going to go through these charts pretty fast, so be ready to flip pretty fast here to keep within my time.

Next chart, please.

So I'm going to briefly try to cover -- looks like it's a little bit too big for this screen -- "How do you transition?" When you're talking about a vertical and short takeoff/landing aircraft, you're talking about transitioning from the hover mode of flight to the forward mode of flight, and if you look at the history of V/STOL aircraft -- all the experimental aircraft that were built -- most of the crashes occurred because they couldn't transition very well.

So one of the big things you look for in something from a safety standpoint is, can you maneuver from the helicopter mode of flight to the forward speed mode of flight? And you'll want what's called a "wide transition corridor" because of the fact that your margin for error is going to be greater, and so there's some things there are inherently involved with that that allow you to do that.

Don't worry about that. Just go to the next chart. That'll be easier.

Don't worry, that's just the outline of topics. That's good.

I got this chart up here because of the fact that -- "How do you summarize V/STOL aircraft?" And what you're seeing here, although it doesn't show up too well -- on this axis right here (Indicating), you see you can tilt the aircraft; you can tilt the thruster; you can vector the thruster; you can have separate thrusters. And if you look at across the top, these are the devices that allow you to do that. There's rotors; there's propellers; there's ducted fan, and there's turbofans and turbojets.

And this kind of matrix here (Indicating),

over the last 30 or 40 years, everybody's tried to design vehicles with respect to these kinds of capabilities, but there's only two vehicles that ever have made it to production out of this whole matrix here, and that's the helicopter up in the upper left-hand corner up there (Indicating), and then second-from-the-bottom, on the right, is the vector thruster, and that's basically the Harrier or the AV-8.

Now, the Harrier is not really much of a vertical takeoff machine. It's really a short takeoff/vertical landing, because of the fact it can't carry much payload in a vertical takeoff mode.

The tiltrotor that we're talking about is the second one down, or this one right here (Indicating), and some of the advantages of that -- and I can tell you from firsthand experience of flying Scout helicopters in Vietnam -- is, you don't want to always tilt the aircraft. In a helicopter, if you accelerate and you decelerate, the aircraft is tilting back and forth, and sometimes you don't see -- you can't see where you're going because of that.

What you can do with a tilting thruster is basically you can keep the attitude level. You can

accelerate, and that's basically what a tiltrotor allows you to do. But it also has the inherent advantages that the helicopter has, and the inherent advantages the helicopter has is something called "cyclic pitch control," which, again, a lot of people don't understand, but the reason the helicopter can maneuver and can fly closer to the ground and around obstacles is because it has a direct control of the thrust vector. None of these other concepts allow you to do that as effectively.

Can I have the next chart, please?

So this is kind of a comparison of the tiltrotor with other V/STOL concepts. I'll end up and show you what I mean by this wide conversion corridor, but it's virtually stall proof.

Some other concepts like tilt wings have been looked at a number of times, but they always have to go through stall every time they transition hover to forward flight. You can convert to the helicopter mode and auto-rotate after complete power failure and land in a small area. Other concepts can't do that. It has moderate down-wash, and so you can operate underneath it.

There's something in rotorcraft design called "disk loading," which is basically the gross

weight divided by the disk area of the rotor, the jet exhaust -- or whatever it might be -- and low disk loadings are things like 25 pounds per square foot. So they're much lower than, say, like a thrust vector, which is thousands of pounds per square foot.

The other thing is it flies forward, backward, and sideward easily, and that's where the helicopter-type control becomes very important. And as mentioned by John Douglass, it's relatively quiet compared to other modes of flight.

The other V/STOL concepts that I showed you in that diagram and the reason that the tiltrotor has transitioned as the winner is because it has these advantages here -- which a lot of people don't understand, but these are distinct advantages that are necessary.

Next chart, please.

This just shows you that the helicopter -- as most of you know, it doesn't make a difference if you're flying forward, backwards, or sidewards, because you can tilt that thrust vector in any direction. Okay, and the thing that allows you to do that is called "cyclic pitch control."

If you throw up the next chart, I'll explain in about one minute what cyclic pitch control is, but basically what you can do is you basically can apply a force here (Indicating), and basically 90 degrees later the rotor will respond by flapping.

So if you put in a pitch control here to the blade (Indicating) -- and you do that because you have two swashplates, and you tilt the swashplate, and that puts in a control -- and basically 90 degrees later the rotor flaps down, and with it, the thrust vector gets tilted. Okay? And this allows you to fly in any direction. Okay? And that is what distinctly -- that a helicopter or a tiltrotor are the only types of vehicles that can do that.

Next chart.

So this is what we mean. We know that the performance of the tiltrotor is far superior to the helicopter, but the helicopter has got -- you know, in hovering, it's hard to beat because of this disk loading phenomenon.

So what you're seeing here is kind of the performance curve, and what it shows you is that basically the helicopter would look like this

(Indicating); but because you can tilt that thrust vector (Indicating), that's what gives you the capability. And that makes the tiltrotor so much more productive than the helicopter or other types of devices because it carries more payload farther and faster, so that becomes very important.

The last one over here (Indicating) -- if could scoot that over a little bit -- this is what is meant by a "conversion corridor." And you see the width of that thing because the Nacelle tilt -- what that means is the tiltrotors are up at 90 degrees, and this is zero degrees (Indicating). Okay?

So you see the width there between the top curve and the wing stall curve down here (Indicating) -- so that means there's lots of margin. What if you get crosswinds -- all kinds of different things that are very, very important for transitioning from one mode of flight to the other.

Last chart.

Now, tiltrotors were proven on the XV-15, and before that, the XV-3. The XV-15 was probably the most successful experimental prototype aircraft ever built. I wasn't directly involved. I became involved

later on with it when I oversaw the R&D program for Army Aviation, but to me, if you look at any experimental prototype, the XV-15 was probably the most successful because it was done the right way and it was investigated.

Now, that doesn't mean when you apply that technology to another application like the V-22, that there aren't some constraints that you encounter, and some of that is because obviously the V-22 has to land on small ships and it's got to be folded up and put below the deck; but that does reduce that diameter or that rotor, and that makes it not as good, say, as what you would desire if you didn't have that constraint. Plus, you have to fold the blades; you have to fold the wing; you have to do all this, so it adds empty weight to it.

So there's obviously some constraints, but you're got to realize that any of those other V/STOL aircraft in that little matrix I showed you would have even worse constraints if they were tried to be put in this environment.

And don't let anybody fool you: The helicopters that are used in the Navy on these ships have had a serious number of problems for numbers and numbers

of years, and if you looked at their accident record and the problems they've had, they've been really much greater than what we'll encounter when we get a successful V-22.

I'm not saying we shouldn't solve some of these problems -- I run a rotorcraft center with lots of capabilities to help out to do that. And I don't think we've always been approached from maybe the Navy and Marine Corps as much as we should, because we have expertise that's been in existence since 1982 and we've got lots of capabilities to help solve some of these problems -- but it would be a big mistake to abandon something that was a winner out of 40 years of looking at all kinds of V/STOL aircraft and you've finally got a winner.

Now, that doesn't mean that accidents aren't -- you know, there are problems. People get killed, and that's bad news. I'm not saying that the whole program has been managed the right way, but don't abandon a concept that's the most revolutionary thing that has come out of aerospace, in the aeronautics side, in the last probably 40 or 50 years, because it is the key to success. Not only from military, but to relieve

some of this congestion we all face at the airports.

Thank you.

MR. GRAY: Thank you, Mr. Schrage.

Our next speaker is Mr. Brian Alexander.

MR. ALEXANDER: Thank you.

I just learned the Panel doesn't have the benefit of our presentation. I'm just going to have Dr. Nevarez hand that out.

Let me get started.

Good afternoon, everyone. I'm Brian Alexander. I am an attorney in New York, with the law firm of Kreindler & Kreindler, and I'm here today on behalf of the majority of the families of the brave Marines who we lost in the two crashes last year. I'm here along with Jim Furman, who represents the Gruber and Brow families.

Our team also consists of Francis Fleming -- little blurbs on our background are up there -- as well as Grady Wilson, a former Boeing V-22 test pilot, aerodynamic engineer; Bill Lawrence, retired Marine Corps colonel, who is also involved in the XV-15 program that was just mentioned by Mr. Schrage; and Raymond Proutty, an aerodynamic engineer.

I want to thank the Panel for allowing us to speak today. I want to thank Mr. Gray; Dr. Nevarez; Colonel Lepan, for his assistance getting set up this morning. Colonel Steel I met this morning. Thank you very much.

I thought by this point I might have heard some things, that I'd have to immediately take issue, which is something that lawyers are trained to do and generally do, but I really haven't, except for a couple things.

We're not talking about GPS here today, okay? The last time I checked, nobody had to get up onboard of a GPS to fly it anywhere. There's not a lot of airways and things of that nature. This is an aircraft that brave soldiers are going to be asked to get on for the next couple decades.

Point one, however, is, we are not here to kill this program. That is not what the families want to seek. Our request is so fundamentally simple that I can't believe, nor will we accept, that it cannot be met.

We will make specific recommendations, but here is the point: We have found -- And when I say "we," it really is the Government Accounting Office; it's

Director Coyle, with the Department of Operational Testing and Evaluation; it's the JAG reports that have been done on these two accidents; it's our review of those, along with our experts -- that there are serious, serious safety concerns with the Osprey. The Marine Corps, to the extent they're involved -- and more importantly, the manufacturers -- must remedy these problems now. They must do them completely, fully, and thoroughly, before this is returned to service.

And that's what we're here to do -- to urge this Panel to make those very tough recommendations; take action to ensure this is safe for operational use before our beloved Marines are asked to get in it again.

Next.

What do we want the Panel to do? We'd like you to determine first and foremost -- and this deals with the April crash primarily -- why a problem as fundamentally simple as asymmetric power settling or vortex ring state was not identified and fully tested by Bell/Boeing long before the Osprey came into the hands of the Marine Corps for operational evaluation.

I'd like to hear from them on how they possibly could have missed something that's been known in

rotorcraft technology for decades; how they could not have applied that knowledge to the unique characteristics of the Osprey. That is the charge to this Panel which is probably most significant.

Next.

Next we'd like them to find out -- ask the tough question: why Bell and Boeing, those that stand to gain most from this program -- along with our Marines and servicemen, and the nation -- from this -- why they didn't tell the Marine Corps of these dangers; how it was possible that this one slipped through the cracks, if that's in fact what happened; why they did not provide adequate warnings, if any warnings at all, to the pilots about this dangerous phenomenon; why they failed to define a flight envelope with adequate safety margin as required; why they failed to provide effective procedures or design changes to avoid this dangerous aerodynamic phenomenon, which unambiguously -- not me talking; not a lawyer telling you -- unambiguously caused this crash.

Pilot error? Human factors? Hogwash. Everyone here knows -- that knows anything about this program -- it was power settling and VRS that caused it. There was no warning to the pilots; no notice to the

pilots.

Next slide, please.

Another thing we'd like this Panel to determine is how it is that this so-called 800-foot-per-minute, 40-knot-calibrated-airspeed limitation came to be in the pilot manual just four months before this crash. Was it a similar incident? Was it Bell/Boeing finally 'fessing up that, "Hey, you know, this could be a problem. We'd better mention something"? And then related to that, how is it that information was derived? What tests were done, if any, to establish that flight limit, to define that envelope?

Next slide.

As a result of what we suspect you'll find when you make those determinations, we would like the Panel to recommend that Bell/Boeing engineers and test pilots perform a thorough and complete test and evaluation of the Osprey and its susceptibility to sudden loss of controlled flight; not back to drawing board, necessarily, as I've heard mentioned this morning, unless that's what's required.

We'd like you to recommend that the manufacturers, Bell and Boeing, conduct a review of the

pilot manual in order to confirm that all dangers and limitations -- not just the ones that caused the April crash or December crash -- have been properly identified; the warnings that are actually effected have been placed in there; and that the existing emergency procedures are determined to be effective.

Next.

We'd also like the Panel to recommend that Bell/Boeing demonstrate that the MV-22 can meet the Marine Corps mission requirements before you give it back to the Marines for more OPEVAL. We want you to recommend that Bell/Boeing engineers and test pilots evaluate and test all known emergency scenarios, including hydraulic failures, to determine if the computer software is properly programmed to handle such emergency situations. That's what caused the December crash.

Next slide.

What have we learned so far? And again, I have to give credit where credit is due. A lot of this information is derived by the Marine Corps themselves and the other government agencies that have looked hard at this program. The Marine Corps was unaware of the danger of asymmetric loss of lift and uncommanded departure from

controlled flight due to VRS and power settling.

Next.

These were quotes from the Department of Operational Testing and Evaluation report provided by Director Coyle, who's already addressed this Panel. "Possible existence of VRS in the V-22 was known when flight limits for OPEVAL were established."

And the phenomenon was known because every helicopter pilot in this room knows about it, but what was not known is asymmetric loss of lift and departure from controlled flight. That's what they're talking about when they say the "unusual attitude following entry into VRS was not expected." "It happens rapidly, with little or no warning to the pilots." So the Corps didn't know; the pilots didn't know. DOT&E says, "We can't yet even determine if we can write this off as an operational safety concern."

And it's not like conventional helicopter problems. Here it's sudden and potentially catastrophic. Everyone here who is a helicopter pilot also knows it's reasonably benign and easy to fly out of in a helicopter. That's the difference.

Next slide.

What else have we learned? Absolutely no warning concerning asymmetric VRS or power settling in the pilot's manual, the pilot's bible. It wasn't there for these gentlemen. No description of flight characteristics associated with VRS and power settling in the manual; no emergency procedure or recovery technique for these pilots on that same dangerous phenomenon.

Next.

Why? Because the NATOPS Manual was completely and totally and utterly inadequate. Again, not me talking; not a lawyer talking. This is the OPEVAL. This is the Marine Corps in their phase of analyzing their own NATOPS Manual. Incomplete. Why? Developmental testing wasn't done. Who's that? Bell/Boeing. Why not? That's the question. That is the charge to the Panel. What are we doing, turning this over to our Marines -- Mission pilots, not test pilots. Our young soldiers, not test pilots. Not Chuck Yeager -- before these kind of things are met?

Next slide.

More of the same. Content of the NATOPS: "Not suitable for operational use." Guess what? It was in operational use on April 8th, on December 11th.

"Contractor" -- translation, Bell/Boeing -- "must expedite incorporation of VRS warnings." Tomorrow? No, now, before this thing goes back. Why? It wasn't there when those guys needed it. Let's fix that.

Next.

What else have we learned? This is the recipe for disaster that -- I think Colonel Morgan's language is what was used here: Not only were these pilots not told, not warned -- happened that quick (Indicating) -- but when they did what any pilot would do -- their automatic, instinctual, and correct, as we know it, reactions -- it automatically, at that precise moment in time, exacerbates the situation. We know the results. You put in your opposite cyclic; you increase your power; you put in the yaw correction. What do you do? You're on your back. That's unacceptable.

Next slide.

Once encountered, no way out. Not me talking. That's Director Coyle and the JAG.

Next slide.

Again, this is a different world from conventional helicopters, which I flew; which Jim Furman, who will speak to you next, flew in Vietnam for over 800

combat hours. This is a world of difference. We know about it. We know what it looks like when it's coming on. We know how to get out of it. But this is more extreme, without warning, and that's significant. It's less forgiving, and that must be resolved before we go forward.

Next.

Again, the limitations are presently inadequate. They're misleading and unrealistic. The operational danger zone -- and this is very important -- is where they intend to operate the aircraft. The way you want to use it is at the point -- on the edge, where the most danger lies. Not me; Colonel Morgan.

Performance envelope may be the one that the fleet pilots can deal with -- i.e., going around the traffic pattern -- but when we get doing realistic training like what they were doing on April 8th and we're trying to do an insertion mission at night, loaded up, with the goggles on, we've got problems. We've got to fix that -- and when I say "we," I mean the contractors -- before we give it back to mission pilots. Get the Marine Corps involved, get their test pilots involved, but don't give it to the line guys until it's ready to

go.

Next slide.

Safety margin for the envelope that I defined earlier -- 800 feet per minute; airspeed below 40 knots -- which is what they've referred to and how they spin this off to be "pilot problem." It's nonexistent. At the very best, it's razor thin. This aircraft -- on April 8th, I'm talking about now -- was within or on the very edge of the defined flight envelope that was then known and under control until that very moment -- and I do mean a moment; that quick (Indicating) -- when the prop-rotor lost its lift; you had a rapid right roll, what we call a "snap roll," and he ended up inverted.

Next slide.

This is also in the back if you want to take a closer look. It's blown up. But here you can see. Green is good. Green is in the flight envelope, and this aircraft, for the last 16 seconds as depicted here, was in the flight envelope. It was descending from about 500-plus feet, down to the ground, and it wasn't until two seconds before impact -- two seconds before impact that it arguably was on the edge of the envelope, and it was at the same time that this aircraft lost lift

and at that moment in time that it was unrecoverable and nothing the pilots can do.

How do we know this? Again, nothing on this graph is made up by this lawyer. This is factual information from the JAG report. The envelope, as defined, exists at 40 knots. The aircraft begins to lose lift right at that point, and we know this because the pilot, at that moment in time, from the FDR, put in left cyclic to correct for it. And what did that do? As I told you earlier, exacerbated the situation and was a recipe for disaster. I urge you to look closely at this because it clearly and unambiguously makes it obvious to everyone who takes the time to analyze it, this was not a "pilot error" case.

Next slide.

These are some things -- aerodynamic factors. I know we've heard some positive things, and there are numerous positive things to say about tiltrotor technology. It is the future, but there are things that must be evaluated further and completely before it's ready for prime time. The proximity of the wing to the rotors means that the airflow state over and above the wing may have some impact on rotor flow. The precise

parameters and dynamics of that must be evaluated before we go forward because it affects power settling and VRS.

Same thing with unsynchronized rotor thrust. We've got to figure that out before we go forward. We have to know how it affects power settling and VRS.

Next.

More importantly, yaw inputs; cyclic inputs; increase in collective pitch; any other changes to the angle of attack on the rotor system. Wind gust, very significantly. The effect of other aircraft, which was the case in April. We must determine fully and completely the spectrum of their effect on VRS and power settling before we go forward.

Lastly, and most obviously, asymmetric aspects of this design. It's like nothing else we've ever seen. It's side-by-side instead of centerline. We've got to see fully and completely what that means with respect to VRS and power settling. That nine-foot separation is critical. Its effects on flight are critical.

The rolling movement of the engines. You've got those massive engines on both sides of this

aircraft. That gives you no margin for error. We've got to figure out the safest way to operate with those dynamics in mind.

Next slide.

The other incidents. There's been several of them. I want to focus on the two that were mentioned in the JAG report. These are ones that are within the flight envelope. We're not talking about steep rates of descent. We're not talking about necessarily slow airspeeds. But for some yet unexplained reasons, not yet known, these airplanes found themselves in similar rapid rolls that could not be immediately corrected by cyclic inputs. We still don't know what caused them. How in God's name can we have our Marine pilots still flying without answers to that? Get the answer before we move forward again.

Next slide.

Other crashes, including North Carolina, have demonstrated that the critical relationship between computer software, the flight control systems, and any unexpected anomaly, could be mechanical; could be aerodynamic. This relationship has to be closely examined. It has to be fully vetted by the contractors

before we return it to the Marine Corps.

Next slide.

This is the "big picture" statement that I make on behalf of the families, and myself, frankly. This program is a prime example -- It's changed since I was in. I got out in '90. The program has changed. There is a move to integrate more the involvement of the services, and there's some great aspects to that. It was necessary for a lot of reasons, some of which have been mentioned previously.

But there's a huge problem, and people in this town have already hit on it; and it's actually going to drive the train, but you need to be thinking about it because it has an effect on the Osprey Program and the Osprey Program is the best example of the problem. And that is, that the system has to be changed to ensure there's a threshold level of safety before the aircraft is turned over to the service for evaluation and integration.

This can be achieved only one way: vigorous testing performed by those with the most expertise. It is not the Corps, with all due respect to the Corps. It's not the Army, which is my service. It's

not the Navy. It's Bell/Boeing and their great group of engineers and test pilots. They are the ones responsible. They're the ones that must do it.

Next slide.

We understand from our sources -- and that's a variety of sources -- that there is absolutely no data and testing to support the power settling limitation I mentioned earlier. If I'm wrong, that's great, but I'd like to see it. How is that possible? How does it find its way into the manual when there's no basis for it? You must determine the answer.

These contractors were required by law and by contract -- check out the contract -- to identify dangers and limitations; then turn around and propose warnings, cautions and notes, to go into that bible, into the pilots' manuals. There is no doubt in my mind they have failed to do that here and for some reason somebody has accepted that failure. Don't do it. Send it back. Get it fixed.

Next slide.

We're concerned, in the present integrated testing environment, the manufacturers have a vested interest in not telling the military everything. This

must change. Basic developmental testing to determine aircraft performance capability, define the precise flight envelope, and establish appropriate safety margin, has to be done by Bell/Boeing in this case, in wind tunnels, in simulators, and under those same controlled flight conditions that Chuck Yeager had available to him. Inch by inch, knot by knot. Not at night, NVGs loaded up, with a mission pilot who's not a test pilot. Find out why that's going on and fix it.

Next slide.

These are our other concerns. I heard Mr. Schrage -- the only thing I do have to address -- tout one of the advantages of the Osprey: its auto-rotational capability. I know you've already asked this hard question and have the question. I'm here to tell you it doesn't have an auto-rotational capability. It does not have an auto-rotational capability. It is prohibited by the manual. So explain to me what good is the black and white ink that gives you the slide that says it can do it when it can't do it?

Let's get it done. All the more reason to slow it down, send it back to fix that problem. God knows we can do it. We have the technology. We've got

men on the moon. We've got GPS. This tiltrotor technology is great. Let's just get it to greatness and not settle for mediocrity.

Airspeed integrator lag is very important, a significant contribution to what happened in April. How can you expect pilots to live by a defined envelope when the only parameter that's significant -- airspeed, as well as rate of descent -- is the aids on an instrument they might not be able to see with NVG goggles on as clearly as they ought to, may not have the best layout, and has a lag time, when all you get is one second? Can't happen.

Lastly, -- addressed to December -- software verifications have not been performed. Not me; that's DOT&E that says that. You've got to make sure, as is the standard, custom, and practice, that those verifications are done by the contractors, and it's criminal to allow the program to go forward, as much dependence as there is on the software, unless that is done.

Next slide.

Here are our recommendations. And I'm probably past my time. I'll run through them very

quickly.

That Bell/Boeing provide performance charts which actually reflect the flight conditions. They did not do this prior to the April crash. Require that Bell/Boeing complete rigorous developmental testing to identify all dangers and fix them. Require they research the envelope simulator; wind tunnel; actual flight test.

Next.

Developed a realist flight envelope to protect the pilots. An airspeed limitation with an associated rate of descent limitation is not good. It's nonsensical. Any rotor-copter pilot will tell you that doesn't make sense; it should be a gradated -- graduated, rather -- limit through a range of descents and a range of airspeeds, not a brick wall, or in this case a cliff, which in that quick a time (Indicating) you're beyond. Bell/Boeing needs to develop and implement design changes and whatever other procedures are required to enable pilots to recover when asymmetric loss-of-lift scenarios are encountered.

Next slide.

They need to conduct additional flight

tests to determine the effects of formation flight, which I understand has been done in part, but it has to be done completely and thoroughly so that all effects are known.

Lastly -- that's all right -- the flight computer software, as I mentioned earlier. They need to find ways, if possible -- and this is actually Director Coyle's suggestion -- to make the software so that it does two things: make it able to warn the pilots, which I think is doable, and if possible, make it able to instantaneously give the reactions by way of control and power inputs and yaw inputs, if necessary, to correct the aircraft if a loss-of-lift scenario is encountered, for whatever reason, whether it's formation flight or conventional VRS.

Last slide, please.

I leave you with these thoughts. First one's from that brave Marine who stepped up to the plate and sent the letter to the Marine Corps and to others about the problems with the Osprey and the unfortunate coverup. What's he saying here? It is not ready for prime time. Why are we rushing it? Slow down. Make it right. If I know anything, it is that our Marine Corps deserves that. And I'm not alone. Major General Admire

echoes that point.

We're not in combat, the last time I checked. We've got some time. This is a 40-year or 30-year or 20-year, or however-long-it's-been program. A few more years won't kill us. Do not allow the money to drive the train. Do not allow deadlines to drive the train.

I want to again thank the Chair; I want to thank the Panel, and thank the staff, for giving me this opportunity today. Thank you very much.

DR. COVERT: Mr. Alexander, would you help me, because the slides you handed out to us differ in a number of significant ways, particularly in the latter part, between what you've flashed on the screen? So I'd appreciate it if I had a set that was representative of your talk today.

MR. ALEXANDER: Sure. I will burn you a CD, Doctor, of what I've just said, and you can have -- In fact, I think we might have already arranged for that.

Thank you.

MR. GRAY: Thank you, Mr. Alexander.

Mr. Grady Wilson will not be speaking today, so our next speaker is Mr. James Furman.

MR. FURMAN: As Mr. Gray said, I'm not Grady Wilson, but Grady Wilson is one of the experts that we have retained to advise us in this case and I am going to try to cover some of the things that he would have said if he could be here today.

Distinguished members of the Panel, Panel Staff, visitors, members of the press, and special guests, thank you for being here today.

My name is Jim Furman. I am an ex-Army helicopter pilot. I flew in Vietnam. I've got over 4,400 hours of helicopter time. I was an instructor pilot; I was a standardization instructor pilot; I was a test pilot, and I have approximately 8- to 9,000 hours of total time altogether.

I have been a lawyer for approximately 20 years, and my principal practice is aviation litigation. And I have probably represented more military families in cases involving deaths, especially pilots who have lost their lives in military crashes, and I am here today on behalf of those families.

I am here specifically representing the families of Major Gruber and Lieutenant Colonel Brow. The widows, Mrs. Brow and Mrs. Gruber, will speak to you

here shortly. They are proud Marine families. They are proud of their husbands' service, and they are proud of the service they did to the country.

They are not here to condemn the Marine Corps. Also, they are not here in an attempt to bring an end to this Osprey Program. They are here really for two purposes: to make sure that what killed the pilots and the 17 other Marines on April 8th, 2000, will never happen again, and to clear the record and correct a grievous wrong.

The pilots of Nighthawk 72 have been unjustly and falsely accused of causing the crash of April the 8th, which resulted in the loss of their own lives as well as the lives of 17 other brave Marines. This accusation has compounded the grief which would normally be felt as a result of such a tragic loss, the accusation that their husbands were responsible for these deaths.

Euphemisms such as "human factors" have been used. It is clear from the press releases and the statements subsequent to the investigation that these pilots are being accused of operating the aircraft outside of the flight envelope and that such operation

was the cause of the crash. In fact, official positions have gone on to exculpate anything having to do with the tiltrotor technology.

It has been said that the April 8, 2000, crash does not implicate tiltrotor technology. This conclusion is based -- is not based on an objective factual analysis of the crash, the technology, and completely misses the mark. It is an attempt to deny the reality that tiltrotor technology is still within its infancy, notwithstanding the fact that it has been the subject of studies and prototypes for many, many years.

Moreover, we believe that what happened on April the 8th, 2000, is so fundamentally related to the tiltrotor technology that it cannot be ignored. There are abundant factual findings and conclusions in the JAG report that severely implicate the technology. All the proof that is necessary to identify the design, the testing, and the lack of adequate warnings as a cause of the April 8, 2000, crash is contained in the JAG report, the report by Phillip Coyle, and the OPEVAL report.

To conclude from these facts presented that the pilots were flying outside of the flight envelope is a denial of the reality presented by the

facts and a strained and inaccurate interpretation of the limitations presented by the flight manuals.

The JAG report states what brought the aircraft down on April the 8th was the Osprey's unique response to vortex ring state. Vortex ring state is a phenomenon that has been known concerning helicopters for many years. However, most helicopters have a fairly benign vortex ring state.

The JAG report states, "Though all rotorcraft have the potential to enter a vortex ring condition, recorded occurrences to date have been rare. The fact that this aircraft not only found itself in vortex ring state condition with no apparent warning to the air crew, but also departing controlled flight, is particularly concerning."

The report goes on to say, "In traditional rotorcraft, power settling would cause uncommanded rates of descent and, depending on altitude, may result in a hard landing or quite possibly a controlled crash. In all likelihood, however, such an event would result in the aircraft at least hitting the ground in an upright attitude."

Most helicopters respond to vortex ring

state by a loss of symmetrical lift, not asymmetrical lift. This results in an increased rate of descent. Single-rotor and tandem-rotor helicopters can easily recover from vortex ring state by simply flying out of the disturbed column of air.

However, in the Osprey, if vortex ring state occurs to one rotor to a greater degree than the other, the aircraft will respond in a roll approaching 100 degrees per second. This does not permit the pilot an opportunity to fly out of the condition if he is close to the ground.

The JAG report goes on to say, "Because of the approximately 8 foot-8 inch separation between the prop-rotors . . . it is possible to have one rotor impacted by the effects of vortex ring state while the other is not, resulting in an asymmetrical condition." The JAG report says, "We believe that this was the case in this mishap."

Though VRS may have been the initiating event, what caused the crash was an uncommanded roll and loss of roll authority. The result is a departure from controlled flight. An uncommanded roll does not necessarily occur as a result of a rapid rate of descent

at slow airspeed. An uncommanded roll can occur any time disturbed air changes the angle of attack of the airflow through the rotor system.

Besides a steep rate of descent, the helicopter can encounter an uncommanded roll by flying through the wake vortices of a preceding aircraft, or it can encounter strong winds and turbulence as winds cross over terrain, buildings, and ship structures.

Vortex ring state has been known for many years. Pilots are exposed to it while going through pilot training. There are also discussions in most of the helicopter NATOPS manuals. However, it is a condition that helicopters will not see very often and is a rare occurrence.

Nothing in the previous training or discussions in the manuals prepared these pilots of Nighthawk 72 for what they encountered that night. The NATOPS Manual for the Osprey does not even address power settling or vortex ring state. It does address settling with power, which is found in the emergency procedures section of the manual.

According to Navy flight manuals, "settling with power" is something entirely different

than what was encountered by Nighthawk 72, and different from power settling or vortex ring state.

The NATOPS manuals for all other current Marine helicopters have discussions of vortex ring state and settling with power. The NATOPS Manual for the UH-1N, a Bell product, draws a distinction between these phenomena.

The Osprey manual does not mention, nor does it provide a procedure for recovery from VRS or power settling. Though the Osprey manual does include the warning, "avoid descent rates of 800 feet per minute or greater, at airspeeds less than 40 KCAS," it follows that with a procedure for "settling with power." This warning, which is not found in the chapter on flight characteristics or normal procedures, where you expect to find it, is a limitation that has been identified as defining the flight envelope at issue in this case.

I would like to point out that the warning that is given, even if it did apply, says, "avoid" airspeeds below 40 knots, at descent rates greater than 800 feet per minute. Other NATOPS manuals use more imperative language. In the Bell UH-1N manual, it says, "Do not exceed 800 feet per minute at airspeeds less than

40 knots." Why is there a difference?

But as stated before, this limitation is only associated with discussions with "settling with power." That is a major distinction that needs to be looked at.

"Settling with power" is defined in the NATOPS manuals as a condition where essentially the power is not available to do what needs to be done. If you think of an automobile going up a steep hill that is underpowered, it may not be able to make it to the top. And that happens sometimes in helicopter operations where you're overloaded, or a high-density altitude condition and you're coming in fast and you just run out of sufficient power to be able to control the descent; but even in those circumstances the helicopter usually lands in an upright condition because we are not seeing the same phenomenon of disturbed air with the rotor system.

The OPEVAL report states that "the NATOPS Manual lacked adequate content, accuracy and clarity. Additionally, because of incomplete developmental testing in the high rate of descent regime, there was insufficient explanatory or emphatic text to warn pilots of the hazards of operating in this area."

Not only was there no discussion in the flight manual, "the flight simulator did not replicate the loss of controlled flight." The pilots were never told about it in the manual and they could fly the simulator in a low speed, high rate of descent condition and not experience this phenomenon -- the simulator that's supposed to have trained them how to handle unusual situations. Surprisingly, the simulator was not programmed for this type of event.

As I understand, after some reprogramming, a post-accident simulation test showed how razor-thin the edge of the flight envelope is and how it is lacking in any margin of safety.

A simulation was done at 39 knots and zero feet per minute rate of descent. Pulling the thrust levers full aft caused an immediate descent rate of 800 feet per minute. Forward application of the thrust control levers resulted in uncontrolled flight. Within three seconds, the simulator exhibited in excess of 3,000-foot-per-minute rate of descent. It is not clear from the documentation whether or not asymmetrical conditions could be duplicated in the simulator.

Such a razor-thin boundary between

controlled flight and uncontrolled flight is unacceptable. There is no margin of safety.

Compounding this unexpected black hole is the inherent instrument error that occurs at low airspeeds and the inability of a pilot who is flying night vision goggles to even see the vertical speed indicator, so how can he observe that boundary?

Quoting from the Coyle report, "Testing today suggests that should a pilot inadvertently exceed published limitations, there may be no easily recognizable warning that the aircraft is near the danger zone." "The first indication a pilot may receive that he has encountered this difficulty is when the aircraft initiates the uncommanded, unrecoverable roll condition."

It is clear that these pilots had no reason to believe that the aircraft would enter into this uncontrolled state. The flight envelope is poorly defined and nonexistent for VRS. No warning was given concerning vortex ring state and no procedure was provided to the pilots. The reason this is so is because this area of the flight envelope was never thoroughly tested by the contractor or explored during developmental fight tests.

The Coyle report: "Since identifying the boundaries of the vortex ring state danger region involves complex, poorly understood aerodynamics, successful mapping of this region must be accomplished via a program of flight tests, wind tunnel testing, modeling and simulation." This was not done with respect to VRS prior to April 8th, 2000. If it was, it was never reported to the Marine Corps.

Because of the unique design of the rotor system of the Osprey, this should have been fully studied. Quoting again the Coyle report: "The basic aerodynamic mechanism of VRS is common to all rotorcraft. However, the problem mechanism that initiates the sudden and potentially catastrophic departure mode in the Osprey is unique to the side-by-side configuration."

The reason for the difference in response to VRS can be traced directly to the unusual configuration of the Osprey. This is the only domestic production aircraft that has two rotors placed side-by-side on pylons at the end of wings. Unlike all other helicopters, the rotor systems are not over the centerline of the fuselage.

But unlike, say, for instance, two

single-rotor helicopters flying side-by-side, if one rotor of an Osprey encounters a loss of lift, it will have a seesaw effect on the rest of the aircraft and the other rotor system. This seesaw effect results in the loss of control authority as well as an uncommanded and very rapid roll approaching the 100 degrees per second.

Also unlike conventional helicopters, the uncommanded roll will not have the beneficial effect of allowing the aircraft to fly out of the column of disturbed air. Instead, the uncommanded roll will cause the Osprey to pivot about its longitudinal axis because of the tremendous amount of thrust and momentum that is being produced off the rotor system on the opposite side. All these factors were unknown to the crew of Nighthawk 72 on the night of April 8th.

There are many more points that I'd like to make. I've brought copies of my written statement. I think that we've probably run out of them by now. If you would like to have a copy, just see me afterwards. I'll give you a card and I'll send it to you, or perhaps you can get it from the Panel.

In closing, I'd like to encourage the Panel to identify the real culprit here: an immature

aircraft program that has not been adequately vetted. Before another Marine life is put at risk, the Osprey should be fixed and fully tested.

The crashes of two Ospreys and the loss of 23 lives have been costly enough. It will be unconscionable to ignore the lesson that can be learned and run the substantial risk that these crashes will happen again.

I heard it said by a previous speaker that this program should not be canceled because of the fact that the lives of these Marines have been given, and their lives will be given in vain. It would truly be a loss in vain if lessons are not learned from this tragic event.

These Marines pilots gave their lives for their country. They should not also have to give their reputations to save the Osprey Program. Their widows, children and families, should not have to bear the shame and the grief of their loss as well.

Thank you for your careful consideration to my remarks.

MR. GRAY: Thank you, Mr. Furman.

Our next speaker is Mrs. Stacey Nelson.

MRS. NELSON: Well, thank you for letting me talk to you today. I'll ask for your patience as I'm not so eloquent as those who have preceded me.

I'm here on behalf of each of the Marine families who have joined together in a unified effort to see that the Osprey is made safe. The families are very concerned about the safety of the aircraft and would like to see that the evaluation which this Blue Ribbon Panel is conducting is thorough, objective, and complete.

Make no mistake, we are not now, nor have we ever been, program killers, as that term has been used frequently in the media. Rather, our first and greatest priority is simply to ensure that no other Marine is asked to give his life until this aircraft is safe and until it is determined to be ready for the Marine Corps' mission.

We ask that your actions and recommendations be guided by the desire to make certain that no other Marine family ever has to endure the pain, suffering, and loss which we have because the Osprey is not safe.

Based on what we have learned, we do not believe the aircraft is ready. It is our opinion that

the best plan of action for the Osprey is to return it to the companies that built it, and require them to perform all the necessary testing to understand the existing dangers and to then fix those problems before the Osprey is returned to the Marine Corps.

I have learned through many sources, including some Marines, the media, my attorneys, and our experts, that there are many legitimate and serious safety concerns which have recently been identified as a result of the April and December crashes and subsequent investigations.

As you all have no doubt learned already, many of the safety issues relate to the April and December crashes. However, our concerns are not limited to the crash which caused my husband's death and the death of four Marines more recently in the December crash. Our concern as Marine families is the big picture: to see that all of the known dangers of the Osprey are identified, examined, and fixed through more rigorous testing.

You gentlemen have been given an important responsibility and I know you have focused upon the many technical presentations that have been provided by such

organizations as the Department of Operational Testing and Evaluation and the Government Accounting Office, and others, and I'm sure that you have reviewed thousands of pages of documents and analyzed the nuts and bolts of the aircraft and tiltrotor technology.

In short, I know that you have been thinking about the program and the program and the program, asking, "Will it live or will it die?" I simply want to remind you -- in fact, ask you -- when you consider the program at every moment of your review, please remember that the life's blood of my husband and 22 other brave Marines is now and forevermore a part of this program.

I can assure you that each one of them, as dedicated as they were to the Marine Corps and to the success of the Osprey, would implore you to see that no stone is left unturned, no question unanswered, and that no safety issue is unaddressed; that every problem is fixed, and that this aircraft is made safe before it is sent back to be used by your beloved Marines.

I would like to also take this opportunity to briefly tell you about my husband and how this tragedy has affected me, my daughters, and Brian's parents.

Unfortunately, there are not enough hours in the day for me to really tell you what kind of a man Brian was and how his loss has affected those who loved him. He loved his job, and it showed. It took great pride in his work and accomplishments. His expertise and enthusiasm won him the Instructor of the Year award in 1998.

Brian felt that you could never know enough, and he continually sought out knowledge. He received his Bachelor of Science degree in Aviation Management from Southern Illinois University posthumously. He was very competitive in all that he did, both professionally and personally. He loved sports of any kind, and he felt that a mountain bike was the only way to travel -- besides the helicopter.

The following is an excerpt from the last letter he wrote. I received it the day he died. It's dated April 5th, and he writes, "Stacey. Hey, Baby, I'm getting ready to go to work. I have to fly late tonight, so I'm going in late. I received the picture of Baby Nelson and it's so cute. It's really hard to believe that Brian Nelson has a beautiful wife, soon-to-be two beautiful children, and a house, with a dog. It's all

because of you. You've given me this wonderful life and I thank you for it. I love you very much. Well, I'm going to work. Love, Brian."

Brian never saw the family he loved again. He isn't here each night as I console his four-year-old daughter, Isabel, when she wakes up crying for him in the night. He wasn't there when I gave birth to his second daughter, Phoebe, and he isn't here as I try to muster the will to simply get through yet another day without him.

His parents mourn the loss of an only child. His death has left a void in their lives that will never be filled.

I can assure you the pain and loss that my family has suffered has been felt by each of the other 22 Marine families whose loved ones died last year in the Osprey crashes. Please see to it that all the Osprey's problems are fixed, no matter how much it costs or how long it takes. Please don't allow the program to go forward until the aircraft is truly safe for our brave Marines.

Thank you.

MR. GRAY: Thank you, Mrs. Nelson.

Mrs. Harter will not be speaking. Our next speaker will be Dr. Connie Gruber.

DR. GRUBER: Good afternoon. Thank you for allowing me the opportunity to express my thoughts and concerns.

I also am not here to condemn the Osprey. My husband gave his life for that aircraft. But unfortunately it has very serious problems, problems that killed him and 22 other Marines in two separate accidents last year alone -- Marines who were our friends.

In response to these senseless tragedies, I have confidence that the Marine Corps will do the right thing. Last month, I personally met with General Jones and he assured me that he is going to do the right thing. Because he is an honorable man, I believe that he will.

Just two weeks ago, I stood before approximately 75 Marines who gathered at New River Air Station in support of my husband as he was awarded the Meritorious Service Medal for his outstanding contributions to the V-22 Program and his faithful service to this nation. Ironically, I come before you now to defend his name and reputation.

I speak today on behalf of Major Brooks

Scott Gruber, a man who cannot speak for himself because his life was tragically taken at the age of 34 by a horribly violent accident, an accident that never should have happened. In fact, an accident that could have been avoided if only Bell and Boeing had presented the Marine Corps with a safe aircraft.

Because I am so keenly aware of my husband's intelligence and talents as a highly skilled pilot, carefully selected to be among the elite group of first Osprey pilots, I knew from the very beginning, as I have always known, that nothing my husband did contributed to that accident on April 8th in Marana, Arizona.

It did not take another senseless tragedy in December or discovery of maintenance falsification to convince me of that. My support of my husband and the entire crew that was with him has been unwavering. They did their very best, based on what we now know was extremely limited information about what that aircraft would and would not safely do.

If this program was rushed along to meet deadlines, advance personal agendas, curry political power or financial gain, it would be at the most

unspeakable and unconscionable; at the very least, it would be disturbing, distasteful, and downright disgraceful. Ultimately, it could even be criminal. Clearly, these two accidents cannot be compared to other aviation accidents in history. They weren't just part of the standard routine of the hazards of introducing a new aircraft.

I encourage all of you to have the strength of character, the integrity, to just say "no" when things aren't right. This is a very basic principle we teach our children. Yet, as adults, even as leaders and role models, we fail and fall victim to misplaced priorities, exuberance, and possibly outright deception, sins that are as old as the beginning of man.

Although we cannot change the sins of the past and we cannot bring our loved ones back, we can right this wrong for the future. I implore you to do the right thing today: to hear the evidence and see it for what it is, not for what we may want it to be, in order to save a multibillion-dollar program that has sadly spun out of control and taken 23 precious, irreplaceable lives with it.

I ask that you say "no" to putting

programs and products before people; say "no" to unnecessarily putting America's greatest patriots in harm's way; say "no" to blaming those brave souls by wrongly accusing them of crimes they did not commit and have no way of defending themselves against.

My husband and the rest of the crew slaved for the Osprey Program, but they willingly poured all their energy, their heart and soul, into it. To accuse my husband of not only causing his own death, but contributing to the deaths of 18 others, is something the Gruber family cannot live with and should not have to. I cannot begin to express to you how this wrongful accusation compounds our pain and prevents any progress towards healing.

My husband and the other crew members fully intended to safely land that aircraft that night. There was no communication indicating concern. There was no "mayday." Something went horribly wrong with that aircraft; something they did not expect; something they were not properly trained to deal with; something they are in no way responsible for.

Therefore, it is right and it is just that the pilots be exonerated from "human factor" errors. I

would like for this finding to be removed from my husband's record so he can be remembered -- so all those onboard that night can be respectfully remembered and portrayed in V-22 history in the truthful and honorable way in which they deserve to be.

My daughter spent only the first six months of her life with her father. She is now too young to know and understand any of this. But one day she will know everything, and I want to be able to tell her what a true hero and patriot her father really was. I don't ever want her to feel a sense of responsibility or disappointment any time she asks anyone about her father, either what kind of a man he was or what kind of a pilot he was.

I ask that you hold the parties, the ones that knew or should have known about the hidden dangers of this aircraft, the makers of the aircraft, responsible for the devastation of the lives of those of us who will forever be impacted by their poor judgments, overzealousness, or carelessness.

General Jones told me in our meeting that not a day goes by that he doesn't think about these tragic accidents and the effects they have had on all of

the families. He assured me that he would keep the families in mind regarding whatever decision he made about the Osprey. I would request that the Panel also take into consideration how the impact of any decision that you make will affect the 23 Marines and their families that have so dearly paid the ultimate price.

We all have to face ourselves in the mirror. Our conscience compels us to do the right thing and to do what we can live with. Let us all pray that the right decisions will be made to recognize the valiant efforts and noble sacrifices of these faithful Marines who did their best for their country.

Now, please, do your best for them and their families to provide us all with absolute certainty that they did not die in vain.

On behalf of my husband, Major Brooks Scott Gruber, I thank you for your time and attention.

MR. GRAY: Thank you, Dr. Gruber.

Our next speaker is Mrs. Trisha Brow.

MRS. BROW: I wish I had blown this up in a slide (Indicating) for you guys. This is a picture of the original Operational Test Team, the pilots. There's 11 of them here. Four of them are gone. I want you to

consider that when we make these decisions.

Thank you for allowing me to speak to you. I appreciate your patience as this is difficult for me to discuss. I'm here today for two purposes. First, to ask you for help in clearing my husband's name and that of Brooks, his co-pilot. Second, for you to -- to ask you to stop the V-22 from killing the pilots that fly it.

Eleven months ago today, I woke to my worst nightmare, only to find out it was true. My husband, John Brow, was the pilot of the V-22 that crashed in Arizona. Let me tell you a little bit about my husband.

John left for work most mornings at 6 a.m., and I was lucky to see him by 6 p.m. I often gave him grief about being away from the home and the family. His response was that he had to know he had done his best so he could look himself in the mirror every morning.

He had an enviable reputation as a skilled pilot and was known as a great officer to work for. John has approximately 3,700 hours of different airplanes. He was one of the most careful pilots and would not hesitate to cancel a mission if things weren't right. His peers tell me he was the ultimate professional.

There was one slot in the V-22 Program for a KC-130 pilot. When John put in for the program, I knew he was the best man for the job and even made suggestions for the resume. However, I didn't think John would be selected because he was not political in nature. To quote a three-star Marine general, "To be chosen for this program was more difficult than to be selected for General."

Given the politically sensitive nature of the V-22, there weren't going to be just any operational testing. They wanted the best. The fact that John was chosen is a testament to his ability and his standing in the Marine Corps. The KC-130 community was disappointed to see John leave. John's answer to them was he thought he could make a difference in the Osprey Program.

John was the NATOPS officer for the V-22 Operational Test Team, which means he was in charge of the flight manuals. This was not a new thing for John. When he was a KC-130 pilot, he even wrote refueling manuals for the helicopters they refueled. He was good at it.

John knew the Osprey manual as well as anyone. Before his death, he had submitted more than 400

corrections, and validated and detailed technical information for two major changes to the flight manual. They gave him a medal for that. Despite the immaturity of the manual, he was trying to correct it.

Vortex ring state, the condition they say caused the crash, was not addressed in the flight manual. If it were, John would have known it. From what I understand, the V-22 was not adequately tested for the phenomenon. The 103-test plan to look at various rates of descent were reduced to 49, and only 33 of these events were actually performed. I find it unacceptable that the Marine Corps cited "human factors" as the cause of the crash when there was no mention of the phenomenon in the flight manual.

The little information that was available apparently was labeled incorrectly. If John, as the NATOPS officer, did not know this could occur and how to fix the situation, how would a regular pilot know what to do?

While I thought of myself as an informed military wife, the process of discovering how my husband was killed has been painful. Unnamed Pentagon sources spoke to the papers daily; yet, no one spoke to me. I

waited three and a half months for some answer. All along, I felt like the program was being pushed too hard and too fast. I would like to raise a few questions that have bothered me.

At Christmas of 1999, the Operational Test Team came home early with less than 10 percent of the flying done and virtually none of the shipboard flying completed. While I was happy to have John home, I was surprised since everyone had been denied Christmas leave because there was a big rush to complete the testing. Apparently they could not finish because of manufacturing problems they had discovered. Could someone tell me why bolts on rotors of brand new aircraft from the factory are found finger-tight on rotor systems and had to go into re-work?

On February 20th, when John left for the shipboard tests, the aircraft were not initially in an "up" status. John was to be the first to leave because of his expertise in refueling. That morning, he was at home, on the phone with the tanker pilots, re-routing the missions. John's aircraft did not have a working oxygen system, so he could not fly above 10,000 feet.

Developmental testing on the icing system

had not been fully tested, so John had to fly the south route to San Diego. Originally, the Ospreys were supposed to depart at the same time, but since the aircraft were broken, they limped out to the West Coast separately. They even broke along the way to the operational testing. How can they say this aircraft is ready for the field?

John told me of other problems. While in Yuma and flying in formation, they broke 11 windshields that supposedly cost $80,000 apiece. Why?

Replacement parts would show up not ready for issue and have to be returned to the plant. Why?

Slip rings on all the aircraft were replaced immediately after John's crash. Why?

The Judge Advocate General says that the V-22 has a propensity to roll. There was a case of uncommanded roll prior to John's death and another after his death. Why has this issue not been resolved?

On "60 Minutes," I watched in horror as they showed the crash of the previous V-22. Those pilots walked away. In John's crash, the plane rolled over in a similar manner. Engineer friends tell me the two situations differ that started the roll. It does not

matter to me. They were still in a roll that caused their death. People knew the aircraft could roll, yet did not fully study this area. Why?

In John's accident, he was the second aircraft of a formation. The development testing of formation flying was less than 12 hours. Turbulence, wake, and other factors have apparently not been fully evaluated. Why?

In closing, John believed in the Marine Corps. He had a great career in the KC-130 which he gave up because he believed he could make a difference in the Osprey Program. John wanted an aircraft that best served the Marines, but he also believed that they had put all their eggs in one basket with the V-22. My wish is you take a hard look at the program and make sure it's the right aircraft for the job. John would have wanted what is best for the Marine Corps, but he would have wanted it to be right.

As I said before, I have the feeling the program was pushed too hard and too fast. They wouldn't let John put in for Christmas leave in 1999 so they could start operational testing, yet it was clear the airplane wasn't ready. Program managers would not call a halt to

the program even after the first crash. There is so much political pressure to do this program; it's like a runaway train. Can you please recommend a way to ensure that this time they take the time and do it right?

The V-22 is very complex. John was faced with production problems, maintenance problems, and poor documentation from the contractors. It may have been in test for a long time by the calendar, but it hasn't been tested as thoroughly as other aircraft. If the Osprey is the right aircraft for the job, I ask that you please ensure that it is adequately funded and tested to ensure this aircraft doesn't kill other husbands and fathers.

As I stated before, John's qualifications were outstanding. Every one of John's fitness reports cited "outstanding airmanship." Neither he nor Brooks were the kind of people who took flying lightly. The Marine Corps chose them because they were the best operational testers they could find. I have recent reports that indicate a lack of testing, a lack in documentation, and a rush to field the aircraft.

Finally, and most importantly, please help me clear John and Brooks' name.

Thank you.

MR. GRAY: Thank you, Mrs. Brow.

Mr. Eckenrod will not speak today. We have the break scheduled next, but since we have only three speakers, with the Chairman's concurrence, shall we just go ahead and finish up?

Mr. Healy.

MR. HEALY: Thank you, sir.

Mr. Chairman; distinguished members of the Panel; honored guests; Mrs. Nelson; Mrs. Harter; Mrs. Gruber; Mrs. Brow; and Susan Duke.

My name is Bill Healy. I'm from the law firm of Healy & Studwell in Tucson, Arizona, the situs of this crash. I've heard Mr. Furman and I've heard Mr. Alexander articulate brilliantly the facts of this case and just what happened, but I'm telling you that the real reason that I'm here and standing up here today is not to articulate all of the technological aspects, the physics, the mathematics, and things involve such as that. I'm sure you're well familiar with those, and I want to tell you what I'm here about.

Today, March 9th of the year 2001, Thomas Duke, surviving parent and statutory beneficiary of Lance Corporal Jason Duke, Deceased, filed a lawsuit. He filed

the lawsuit against Boeing Company, a Delaware corporation; Textron, Inc., a Delaware corporation; Bell Helicopter Textron, Inc., a Delaware corporation; the Boeing Company and Textron, Inc., a joint venture; the Boeing Company and Bell Helicopter Textron, Inc., a joint venture, and various and sundry "John Doe" and "XYZ" corporations.

I forgot to address the distinguished members of the press.

I am a lawyer. I was a pilot; received my jet wings in 1956. Looking around at this crowd and the lack of gray hair, I'm probably the only guy in this room that flew a T-6, but I did back in the early '50s or mid '50s and it was the hardest airplane I've ever flown.

And I remember we had a jet ace who was the squadron commander. His name was McGovereau. And he said to us when we got to jet school, "This is the simplest airplane you'll ever fly, and the most important thing in aviation is simplicity." And this complex airplane brought about this tragedy, killing Jason Duke on April 8th, 2000, in Marana, Arizona, because of the fact there was no simplicity involved.

This case, from a lawyer's perspective,

ladies and gentlemen, is one that we feel very comfortable in trying in Tucson, Arizona, before eight jurors who can right the wrong not only of this tragic crash, but of the pilots. If, indeed, any of the wording in that report about pilot error -- It's our position, and we intend to prove, that it was design-induced.

I have been in touch with naval test pilot aviators. I have discussed the facts of this case; the problems involved; this particular aircraft. And, ladies and gentlemen, and members of the Panel, we are prepared to litigate. Our theories are as follows.

Number one: We feel they were negligent in the design, manufacturing, testing, training, teachers, inspection, assembly, distribution, sale, and maintenance of this aircraft. We think they put a product on the market, ladies and gentlemen, that was dangerously defective, unreasonably defective, and we intend to prove that. Not through lawyers, but through experts; test pilots; helicopter pilots; men of extreme and esteemed recognition in the field of aviation.

And for that, ladies and gentlemen, we intend to right this wrong and show that that young "jarhead" in the back of that airplane, Jason Duke, did

not die in vain.

Without mentioning the fact that we have no axe to grind with the United States Marine Corps, the United States Government -- My father was in the Navy; my mother in the Navy; two of my brothers were in the Navy, and one of them was in the Marine Corps -- all during World War II, and my mother and father in World War I. We are a military family.

I have done nothing flying-wise since I left the Air National Guard in Arizona in 1962, except to remain deeply involved in the field of aviation, because I have been the president for the past two years of the Arizona Aerospace Foundation which runs the premier Space Museum, the Titan missile site, the Aviation Hall of Fame, and the soon-to-be International Fighter Aces Museum in Scottsdale, Arizona.

I've talked to many of these people; many of these aces; many of these jet pilots; many of these helicopter pilots. We're ready to go. We're ready to show that these vendors, as these men so brilliantly articulated, and these women as well -- that they were so at fault; that we intend to establish in this complaint that we set forth here today that the manufacturers acted

to serve their own interests in having reason to know and consciously disregarding a substantial risk of death or serious bodily injury in this aircraft.

And for that, ladies and gentlemen, we would like eight people -- be they Hispanics, members of the faculty of the University of Arizona, engineers from Hughes Aircraft, retired people, young people -- to judge Bell/Boeing. And for that, ladies and gentlemen, and for that statement, we're going; we're going to war, and we've started. It started at noon today in the desert town of Tucson, Arizona.

I thank you for listening. But I want to emphasize, after listening to everybody, this is what Healy & Studwell intend to do for the Duke family now. Thank you very much for listening.

MR. GRAY: Thank you, Mr. Healy.

Our next speaker is Major Susan Duke, United States Army.

MAJOR DUKE: I want to thank the MV-22 Osprey Panel for allowing us to speak here today.

I was Jason's older sister, who was killed April 8th. A couple of excerpts from his eulogy: What a remarkable son and brother we've lost. Jason was

privileged to enjoy many platonic and few romantic relationships that represented many diverse facets of his short but extraordinary life. I was fortunate enough to witness or experience them through Jason.

Here are some characteristics that family, friends, and Marines used to describe my brother, Jason. Generous; loving; adventurous; aggressive; stubborn; a big brother; a teddy bear; a loyal friend, and a renaissance man.

Jason possessed the best qualities from his parents. He had his father's personable and charming disposition, and his mother's passion for humanity and the ability to maintain lasting friendships. I was blessed to have Jason as a little brother. We shared a bond between us that transcends a sister-and-brother relationship. Passions, interests, dreams, entwined our spirits.

The loss of my brother, Lance Corporal Jason T. Duke, has had a devastating effect on our family. When his life was cut short on April 8th, he had just spent a year and three days in the United States Marine Corps. Jason was everyone's favorite, especially my father's. The loss of his youngest child has left him

extremely disillusioned.

Our mother passed away in January, 1999, of Lou Gehrig's Disease. It was Jason who selflessly put his life on hold to care for our mother during her last six months. In the final stages of this dreadful disease, she was completely paralyzed. He literally provided and tended to all her physical and mental demands, which were quite enormous.

Just three months after her passing, Jason enlisted in the Marines. His immediate dream was to serve in the infantry and eventually be selected to serve with the Marines' elite Recon. Jason's goal was to raise a big family that would share his enthusiasm of living a long productive life serving his country. His retirement goals were to own a bicycle shop somewhere on the California coast.

However, April 8th changed our lives forever. Yet, it appears that his death could have been prevented. Only if the MV-22 Osprey had undergone complete testing of aerodynamic flight characteristics, perhaps 19 Marines lives could have been spared.

Gentlemen, I wish to highlight three points to the Panel.

The future of the MV-22 Osprey Program. How can the taxpayers -- or more importantly, the families -- be assured that this problematic program is essential to our national security?

Secondly, pending the results of the ongoing concurrent investigation, those responsible for my brother's death, along with 18 fellow Marines, will receive swift and appropriate legal action.

Finally, honor, courage and commitment -- values of the United States Marine Corps. How can we as a nation not recognize these men with posthumous decorations? My family has submitted a congressional and a Senate inquiry. The results from the congressional, dated 5 February, were negative: "It would not be appropriate to authorize an award based on the fact that they were involved in a tragic accident."

Jason had received two meritorious masts, as well as two promotions within a year of service. The posthumous decoration would be reflective of these men's contributions to the United States Marine Corps.

We are quickly approaching a one-year anniversary and the families still do not have a complete accident investigation report. We do not possess or have

knowledge, complete knowledge, of all facts surrounding the accident.

In closing, I would like to share a few excerpts from my brother's eulogy so the Panel can better understand the effects of our loss of an exceptional son and brother.

Our relationship began when he was a toddler, with daily walks in a stroller; cuddling on the couch during Saturday morning cartoons; sharing our enthusiasm for athletics in the outdoor; our parents' divorce; summer vacations to Southern California, visiting Disneyland, Magic Mountain, and Universal Studios. We especially enjoyed the California coast.

We shared our experiences attending Sacramento High School, and as a sophomore, he took on the school board when further cuts to the athletic budget were proposed. As a very young man, he displayed strong leadership traits.

I believe, as did he, there is no other achievement as distinguished than serving our nation. We collectively uphold the values and beliefs of the world's greatest nation that is able to experience levels of freedom that other countries of the world do not.

Unfortunately, it comes with a price: selflessness.

I believe it was our destiny to serve our country. He served with distinction, as already mentioned. In less than a year's service, he was promoted twice, unheard of in any service, including the Marines. He lived by honor, courage and commitment, long before he joined the Marines. His service with the Marines was only exemplified by his selflessness.

My brother Jason faced death long before April 8. In 1976, he almost drowned at a racquet club we were members of. Ironically, a deaf-mute saved him, along with a neighborhood doctor. In 1994, he was in a life-threatening bicycle accident, a passion he possessed throughout his adult years that served as catalyst to bring about my mother's sobriety.

It was that fateful evening, April 8, at 8 p.m., a catastrophic aviation accident, the worst in the Marines' history, it became painfully evident that Jason had fulfilled his destiny and God's will to come home to Heaven. I want everyone to remember my brother's finest moments were taking care of his terminally-ill mother and serving in the Marines. I am certain this is what he would want you to remember him by.

Since my mother's passing in January of 1999, my brother and I had endured four deaths: a very special extended family member, Loretta Pettus, in September of 1999, and our grandparents Ivan and Margaret Caricozof, in February, 2000.

My brother sold his La-Z-Boy recliner, a gift from his father, so he could purchase his Marine dress coat. He wanted to honor his grandfather, who served in World War II. Yet again he distinguished himself by presenting the colors to our aunt during the funeral service. Additionally, he stayed nights with our Nanna after she went into a coma from a fatal stroke.

I spoke with Jason Friday morning, April 7th, in Yuma, to inform him of another unexpected loss of our cousin on April 6. He had commented that they were due in helo training. After so many losses, it is hard to articulate our emotions. I spoke with him twice that morning. The next call was to inform him of when the funeral services would be held so we could join once again to mourn another family tragedy. Both times we spoke "I love you." We never spoke again.

My brother, the Marine, was not afraid to express his emotion, verbally or physically. Throughout

these painful events, we had learned to live each moment of each day.

A passage from Second Timothy, Chapter 4, Verse 6 through 8: "For I am ready to be offered, and the time of my departure is at hand. I have fought a good fight, I have finished my course, I have kept the faith; Henceforth there is laid up for me a crown of righteousness, which the Lord, the righteous judge, shall give me at that day; and not to me only, but unto all them also that love his appearing."

Thank you for your presence here today honoring my brother Jason, the fallen Marine. Thank you.

MR. GRAY: Thank you, Major Duke.

Our final speaker is Mr. Frank Jensen.

MR. JENSEN: Mr. Chairman, I'm speaking today as an individual who is not affiliated with any of the manufacturers or other entities identified with the V-22 Program. My interest -- and pardon my -- I'm suffering from a bug that's going around in Washington, D.C. here. My interest is as a concerned citizen and a retired military officer with quite a bit of experience in vertical flight activities.

My involvement in vertical flight goes

back to 1955, at which time I qualified as a military helicopter pilot. My rotorcraft experience includes operational flying in the U.S., Europe, and Asia, including Vietnam, as well as service with the U.S. Army Aviation Test Board, which does operational evaluation of new helicopters and fixed-wing aircraft being introduced into the Army.

Since retiring from the Army, I have had a lot of opportunity to work with civilian helicopter organizations. For 19 years, I was Executive Director, President, and now President Emeritus of the Helicopter Association International, and I am the Executive Director of a program, Tour Operators Program of Safety, but today I'm speaking for myself.

Over the years of tiltrotor development, I have had professional reasons to remain informed of the status and observed flights of the XV-15 and the V-22, and now I'm following the progress of the AB-609. I've had many discussions with the designers and manufacturers of V/TOL aircraft and their components, and with military evaluators.

I've had philosophical discussions with such military industry icons as Frank Piasecki, Sergei

Sikorsky, Charles Kaman, and Sergei Mikheyev, regarding the design concepts and feasibility of tiltrotor aircraft. All of these distinguished engineers spoke very favorably of the tiltrotor technology.

I was present and testified at the hearings when the XV-15 made its historic landing on the steps of the U.S. Capitol, and I was instrumental in the removal and replacement by helicopter of the Freedom statute of the Capitol Dome.

I'm convinced that the tiltrotor concept represents a crucial advancement in aviation and is of vital importance not only to the U.S. military, but to the entire nation. Aviation history has shown that almost every significant advancement has been preceded by disappointing and sometimes tragic accidents and failures.

The first efforts to fire machine guns from fighter aircraft in World War I resulted in shooting the propellers off of the aircraft on which the guns were mounted, but some innovation and design changes were made, and the forward-firing machine gun was an important weapon in World War I.

Early experience in the 1930s with the

VS-300 helicopter, the first practical helicopter flown, caused Igor Sikorsky to say that he could get it to fly sideways and backwards, but he couldn't get it to fly forward. He actually considered turning the seat around and making believe the helicopter was heading in the right direction. But he persisted. And he was flying an aircraft that he had designed and he built and for which there were no pilot's instructions, and the rest is history.

During the early days of jet aircraft, one Navy squadron experienced 15 crashes in three weeks. The CH-46 helicopter had 44 mishaps in its first five years of existence, and now the CH-46 is at the other end of its lifecycle and it requires special efforts to keep it flying. It's overdue for replacement, and the MV-22 is the replacement of choice.

The V-22 is not merely innovative. It's a very complex aircraft designed to meet very demanding military requirements, including rotor blades and tail sections that fold up for shipboard use, and redundant flight-essential systems to make the V-22 more survivable against enemy fire. Each of these military systems adds to complexity.

The tiltrotor's flight envelope, while proven through experience with the XV-15 to be safe and practical, is different from that of any other aircraft. Realistically, there will be both mechanical and "human factor" problems in bringing a complex aircraft such as the V-22 to full operational status, and there is no viable alternative to the V-22.

While it is imperative that every precaution be taken to safeguard human life and limb, it is also crucial that the V-22 Program be continued. The nation has already invested significant human resources, time and money, in the V-22. This is no time to fold up out tents and go home.

Thank you very much.

MR. GRAY: Thank you, Mr. Jensen.

This concludes our speakers for today. Basically, we are adjourned.

(Whereupon, at 3:02 p.m., the hearing in the above-entitled matter was concluded.)

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